Acupuncture Meridian-Based Myofascial Release to Treat Knee Pain in Sinding-Larsen–Johansson Syndrome: A Case Report

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CASE REPORT

Abstract

Sinding-Larsen–Johansson syndrome (SLJ) is an overuse injury most commonly seen in young male athletes. It is an osteochondrosis of the distal patella, secondary to excessive traction caused by the extensor mechanism. This case details treatment of a 10-year old boy diagnosed with SLJ who showed marked improvement after utilizing a new osteopathic manipulative treatment technique. This technique incorporates the use of myofascial release along acupuncture meridians to improve function and decrease healing time. The authors consider this case worthy of reporting due to the immediate improvement of the patient secondary to manipulation, and the ability for the athlete to continue activity despite the diagnosis. This case suggests potential for increased utilization of the technique as a concomitant treatment to those modalities already being practiced.

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Background

Sinding-Larsen–Johansson syndrome (SLJ) is named after Swedish surgeon Sven Christian Johansson (1880-1959) and Norwegian physician Christian Magnus Falsen Sinding-Larsen (1866-1930) who independently described the same disease process in the early 1920s.[1] SLJ syndrome is an overuse injury most commonly seen in male athletes between the ages of 10 and 14.[2] It is described as an osteochondrosis, or apophysitis, of the distal patella secondary to excessive traction caused by the extensor mechanism. This condition is often grouped under the general classification of "jumper's knee."[3] The force of the quadriceps—directed through the quadriceps tendon—causes the patellar tendon to distract the distal portion of the incompletely ossified patella (which is still partially cartilaginous at this age). This mechanism, in conjunction with rapid growth spurts in this age group, creates an environment that encourages excessive stress on the patella and patellar tendon. This is the same mechanism responsible for Osgood-Schlatter disease; however, in Osgood-Schlatter disease, there is an osteochondrosis at the tibial tuberosity *(Figure 1)*.[4]

Injury occurs with repetitive overuse of these structures. In most cases, diagnosis of SLJ syndrome should be made based on history and physical exam. Patients present complaining of knee pain located at the junction of the inferior patellar pole and the proximal patellar tendon. History typically will not involve any significant history of trauma or injury to the affected knee. Activities involving the above-mentioned extensor mechanism, such as running, jumping, and kneeling, will cause pain. Pain also will be reproducible with palpation at the inferior pole of the patella. All other physical exam findings will be negative. Additionally, radiographic imaging may reveal calcification of the patellar tendon at the junction of the inferior pole of the patella. However, the absence of this finding does not necessarily rule out SLJ syndrome. Some sources recommend ultrasonography as the primary modality for visualizing Sinding-Larsen–Johansson syndrome.[5] Ultrasound findings would include thickening and heterogeneity of the posterior fibers of the proximal patellar tendon at the patellar attachment location, as well as focal regions of hypoechogenicity due to small tears in the patellar tendon.[1] These same sources note that MRI may also be used; however, this recommendation is reserved to diagnostically rule out more severe conditions (ie, avulsion fractures, osteochon-

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Figure 1. Location of each disease process. Image reveals negative radiologic Osgood-Schlatter findings.

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dral defects, etc.), as opposed to ruling in Sinding-Larsen–Johansson syndrome.[5] MRI findings consistent with SLJ include patellar tendon thickening with high signal (on T2 & Short T1 Inversion Recovery [STIR]) within the patellar tendon and at the inferior pole of the patella.[1]

Approaches to treat these patients are generally conservative in nature with surgery being the exception in rare cases. In those cases, surgical reattachment of the tendon would be indicated if continued overuse led to complete tendon avulsion from the growth plate. However, this is generally avoided since a vast majority of patients respond well to relative rest, ice, nonsteroidal anti-inflammatories, and neoprene knee sleeves. Symptomatic resolution has been noted to occur in 3 to 12 months[5] with return to full activity.

Report of Case

Patient History

A 10-year-old boy presented to the office complaining of diffuse right knee pain. The pain began one month prior, becoming more painful over the previous 2 weeks. It was insinuated that this was due to his increased athletic workload, which now included both soccer and basketball. His primary complaints of knee pain were localized to the distal femur and proximal tibia of the right lower extremity. He described the pain as a dull ache, which escalated up to a sharp pain as his workout became more intense. The pain was only present when exercising, and it was relieved within 5 minutes of activity cessation.

The patient's pain level at the visit was a reported 7 out of 10. His father noted that the pain seemed worse when running and jumping on the hardwood floor during basketball. The patient denied any mechanism of injury or trauma to the knee. He denied any swelling, radiation, or pain with ambulation or pain at rest. He also denied the use of ice or any over-the-counter medications. At the time of the visit, he had reduced his basketball activities to walking and shooting, although he was still actively playing soccer twice a week. He reported that he tolerated his new athletic load; however, he was concerned that he was unable to play basketball to his full potential.

Evaluation

Objectively, the patient's vitals all were within normal limits, with a blood pressure of 108/60, respirations 18, pulse 70, temperature 98.0°F orally, weight 69.4 pounds and a height of 4 feet, 6 inches. He was alert and oriented, and he presented in no acute distress. On auscultation, he had a regular rate and rhythm with no mur-

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murs. His lungs were clear bilaterally in all fields with no retractions. His musculoskeletal exam began at the pelvis, which revealed positive right-sided Stork (Gillet), right-sided standing and right-sided seated flexion tests. Concurrently, he had a superior right anterior superior iliac spine (ASIS) and superior right posterior superior iliac spine (PSIS), resulting in a right-sided pelvic up-slip.

The patient's lower extremities revealed a functionally short right leg, consistent with the right pelvic up-slip. This was diagnosed after finding a cephalad right medial malleolus when compared to the contralateral side. Also present were bilateral tibial torsions with the right side worse than the left, resulting in right in-toeing. This finding was exaggerated when examined with ambulation.

The patient was tender to palpation at the inferior aspect of patella, medial joint space, distal iliotibial band, distal hamstrings (in the muscle belly of the distal one-third of the biceps femoris), and distal quadriceps femoris (in the muscle belly of the distal one-third), with no pain over quadriceps tendon. Additionally, the patient was tender to palpation with tender points located at the medial and lateral calcaneal-plantar fascial aponeurosis. He was found to have equal and full active and passive range of motion of knee and hip.

There was no increase in knee joint laxity when compared with contralateral side. Specialized tests of the knee, including Lachman's, anterior and posterior drawers, patellar grind, McMurray, and Apley grind were all negative. Lastly, the patient's gait and station were analyzed, revealing a normal station and natural gait, with no antalgic components and pes normal. His gait revealed positive in-toeing bilaterally, as well as a prolonged heel strike phase, which resulted in a heel drag bilaterally, with the right being worse than the left.

X-rays were obtained *(Figure 2)*, and the radiologist's report read: "No radiographic evidence for acute abnormality. Minimal irregularity associated with the inferior margin of the patella on the lateral view likely simply relates to incomplete ossification center. The remote possibility of Sinding-Larsen–Johansson syndrome is not entirely excluded."

Diagnosis

The following diagnoses were applied to this patient: right knee pain secondary to Sinding-Larsen–Johansson syndrome, acute strains of the quadriceps and hamstring muscle bellies, and somatic dysfunction located at the pelvis and lower extremity. The plan was to use osteopathic manipulative treatment to improve his pain and function. He was evaluated in the supine and seated positions for

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Figure 2. *Radiologic findings positive for Sinding-Larsen–Johansson syndrome.*

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somatic dysfunctions. He was then treated in the supine position using pelvic muscle energy and lower extremity myofascial release, with attention directed towards unwinding the fascial restriction located at the knee joint. To initiate this treatment, leg length discrepancies were first treated with muscle energy directed at the pelvis, resulting in resolution on recheck. At this time, observation of the patient as he was lying in the supine position revealed the bilateral in-toeing seen during the gait evaluation, which was presumed to be secondary to the myofascial restriction.

Treatment

OMT Technique

The manipulative technique used the spleen and bladder as a guide to treat the restrictive rotational patterns found on exam. Treatment was directed toward the medial side first, due to the direction of forefoot secondary to in-toeing. It was inferred from the forefoot rotation that this was also the direction of the more significant somatic dysfunction in the patient. Monitoring the medial point of restriction (spleen 4) with the caudal hand and the fascia of the right knee (spleen 9) with the cephalad hand, the meridian-based myofascial technique was applied *(Figure 3A)*. As the clinician continued monitoring the 2 regions, the patient's foot was sequentially inverted, knee flexed to 90 degrees, and hip externally rotated to 90 degrees. The arc of motion was completed by sequentially internally rotating the hip, everting the foot, and extending the knee, thus returning the patient to a neutral position and completing the treatment. At this point, the point of restriction was re-evaluated and pain-free.

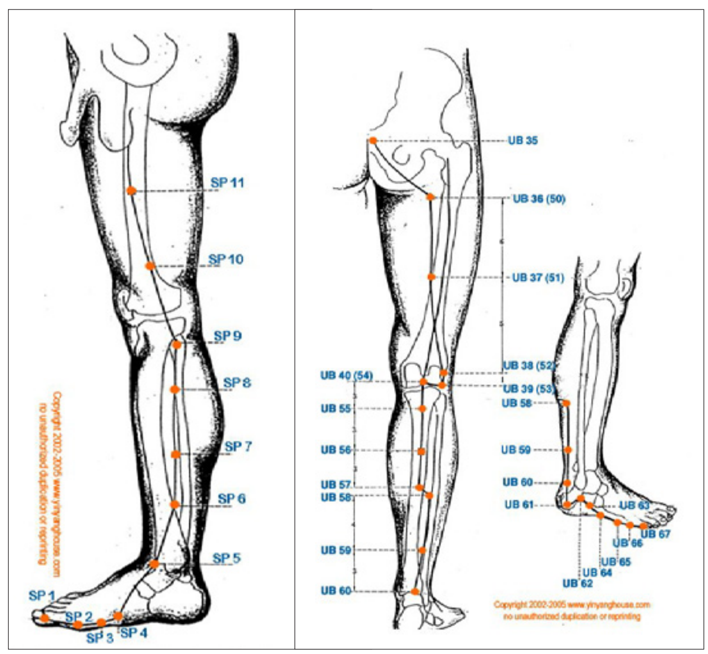
Following this initial treatment, a change was observed in the patient's in-toeing when compared to its pre-treatment presentation. The patient became externally rotated on the treated (right) side, while remaining significantly internally rotated on the untreated (left) side. Treatment was then directed to the left side in the same manner. After treating both sides, it became obvious that the patient was now visibly out-toeing bilaterally, while still in the supine position.

Treatment was then repeated for the lateral fascial restriction using the same technique on both legs, except in reverse order *(Figure 3B)*. This time, while the bladder points 63 and 39 were monitored, the foot was everted, knee flexed, hip internally rotated, and arc completed with external rotation, foot inversion, and knee extension to return the patient to a neutral position. Following this second treatment, the patient was able to lay supine with both feet pointing upwards with no rotation.

The treatment left the patient pain-free and able to walk without the in-toeing previously seen on physical exam. He also noted feeling decreased tightness in his gait. The patient was seen at the office for 2 more visits to reevaluate his knee pain. During these visits, he underwent additional treatments, noting increased improvement at both visits. He was then instructed to follow up as required, and he

Figure 3. *Hand placement for acupuncture meridian-based myofascial release.*

Figure 4. *Acupuncture meridians for spleen (SP) and bladder (UB, also referred to as BL).[2] © Yin Yang House, Inc. All rights reserved. Reprinted with permission.*



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did not require any further visits. When this was discussed with the referring pediatrician, that physician relayed that the patient's pain had completely resolved and that the patient had returned to his previous athletic participation level.

Acupuncture Points

As described above, the acupuncture meridians used were the bladder and spleen meridians *(Figure 4)*. The bladder meridian is located on the lateral side of the lower extremity, and the spleen is located on the medial side of the lower extremity. This enabled the treatment to be directed to both sides of the knee for a more complete treatment. As previously mentioned, the distal and proximal points between the foot and the knee along the meridian were utilized to provide a myofascial release.

On the lateral side, treatment was directed at the acupuncture meridian between the distal point, bladder 63 (Jinmen), and the proximal point, bladder 39 (Weiyang). Jinmen, also known as Golden[6] or Metal Gate,[7] is located "on the lateral side of the foot, directly below the anterior border of the external malleolus, on the lower border of the cuboid bone."[7] Weiyang, or Supporting Yang, is located at "the lateral end of the popliteal transverse crease, on the medial side of the [biceps femoris] tendon."[8] Abnormalities along this meridian are responsible for stiff femoral and knee joints, due to tight musculature.[9]

On the medial side, the spleen acupuncture meridian was used for the treatment. The distal point used was spleen 4, Gongsun (Grandfather Grandson), which is located "on the medial aspect of the foot, in the depression distal and inferior to the base of the first metatarsal bone."[10] Proximally, spleen 9, or Yinlingquan (Yin Mound Spring), is located "on the lower border of the medial condyle of the tibia [either] in the depression posterior and inferior to the medial condyle of the tibia [or] level with the tuberosity of the tibia [or] between the posterior border of the tibia and gastrocnemius muscle."[11] Abnormalities found along this meridian include an edematous knee with temperature changes to the area.[12]

Treatment Model

The treatment described in this case study is directed towards the fascial restriction of the lower extremity. Acupuncture meridians helped guide the treatment location. This treatment was adopted from a technique described by John P. Tortu, DO, in which he uses acupuncture meridians to treat somatic manifestations of visceral dysfunctions. In one of his lectures, Tortu describes a case where a child was treated for jaundice.[13] Using acupuncture meridians as a guide, Tortu monitored the liver as he directed his treatment to the right great toe. During this treatment, he describes a somatovisceral response along the liver meridian that presumably caused a release of the fascia surrounding the liver. According to Tortu, there was an immediate response involving the patient's liver function (resolution of jaundice), quality of breathing and improvement of in-toeing. Simplified, this technique monitors a proximally restricted area (liver) while treating a distally restricted fascial point (great toe).

Following this model, it was hypothesized that this treatment could be adapted to treat musculoskeletal dysfunctions in the athletic population. Instead of using a proximal visceral point to direct the treatment, a proximal musculoskeletal area was chosen based on fascial restriction. Because the acupuncture meridians run through these regions, it stands to reason that treatment could be geared toward any site found proximally along the meridian.

In this manner, the restricted point on the foot was treated while the fascial restriction at the patient's knee was monitored for palpation of a fascial release. In both cases, the resolution of in-toeing occurred at the same time as the resolution of the symptoms, giving evidence of the fascial restriction and its involvement in the symptoms experienced at the proximal restrictive location.

Discussion

The main goal of this manipulative technique was to myofascially treat a distal point along the acupuncture meridian to release a more proximal point—in this case, the points causing restriction at the knee. In using the technique, restrictions were utilized at point SP 4 and BL 63 to release SP 9 and BL 39 respectively. The concept implies that this could potentially be utilized at any acupuncture point along the same meridian. Tortu has had success with this when treating viscera from a distal location.[13] There's no reason to believe that there wouldn't be continued success when treating myofascial restrictions in the same manner.

Conclusion

This technique may be safely used in all populations and for many conditions, but it works particularly well for treating fascial restrictions, including tissue rotations.

For the scope of this article and the age of the patient, discussions included the benefit in utilizing this technique in a pediatric athlete.

Firstly, in this age group, rotational dysfunctions are seen more frequently, including diagnoses such as tibial torsion, genu valgum, femoral anteversion and hip dysplasia. Secondly, in this particular age group, unnecessary irradiation is a concern.

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This technique could be used diagnostically, as well as therapeutically, by removing an overlying and possibly obscuring myofascial component before ordering imaging. Retrospectively, x-rays in this patient likely could have been avoided if this approach were more generally used in screening and preliminary treatment for lower extremity athletic injuries.

Lastly, this technique is gentle enough to be used for all pediatric age ranges. It is an indirect technique which requires no force or increased pressure to the area of injury.

This is the only reported case utilizing this technique. Further evaluation and consideration for use of this modality would be beneficial moving forward. As mentioned above, this technique has only been reported in the pediatric population, although the techniques it is based on have been used extensively with all age ranges.

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